

INSULIN CARB RATIO (ICR) AND CORRECTION FACTOR (CF)

Insulin Dosing Based on ICR and CR

Radhika Koppanur, MS, RD, LD, CDCES

CLINICAL NUTRITION



2021 Virtual Diabetes Management Conference for School Nurses

Provided by Texas Children's Hospital

NURSING CONTINUING PROFESSIONAL DEVELOPMENT (NCPD)

Texas Children's Hospital is approved with distinction as a provider of nursing continuing professional development (NCPD) by the Texas Nurses Association, an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

To receive contact hours for this nursing continuing professional development activity, the participant must:

- Register for the continuing professional development activity
- Attend at least one session
- Complete a pre and post survey
- Complete a participant evaluation online

Print and sign your contact hour "Certificate of Successful Completion" once you have completed the online evaluation.

LEARNING OUTCOME

As a result of this professional development activity, 90% attendees will intend to integrate what they have learned into their professional practice and be able to name one concept learned on the post activity evaluation.

CONFLICTS OF INTEREST

Explanation: A conflict of interest occurs when an individual has an opportunity to affect or impact educational content with which he or she may have a commercial interest or a potentially biasing relationship of a financial nature. All planners and presenters/authors/content reviewers must disclose the presence or absence of a conflict of interest relative to this activity. All potential conflicts are resolved prior to the planning, implementation, or evaluation of the continuing nursing education activity. All activity planning committee members and presenters/authors/content reviewers have had their Conflict of Interest assessed, identified and resolved by the nurse planner.

The activity's Nurse Planner has determined that the following planning committee member(s) and/or presenter(s)/author(s)/content reviewer(s) have a conflict of interest. Those conflicts of interest have been appropriately resolved.

- Planning Committee - Amber Smith – Ownership Interest in Tandem Diabetes Care

COMMERCIAL SUPPORT

This NCPD activity has received no commercial support.

INSULIN CARBOHYDRATE RATIO (ICR)

What is an insulin to carbohydrate ratio?

The insulin to carbohydrate ratio tells you how many grams of carbohydrates are covered by one unit of insulin.

Calculating Your Dose of Insulin for Carbohydrates

Example 1:

Sarah's I:CHO is 1:25 (one unit of Novolog®/Humalog® for every 25 grams of carbs). Sarah has calculated that she will be eating 65 grams of carbohydrates for breakfast.

Apply formula for Insulin to Carbohydrate Ratio (ICR).

This means one unit of Novolog/Humalog will cover this many carbohydrates.

÷

=

Number of CHO
to be eaten at meal
time

Insulin to
carbohydrate
ratio (ICR)

Units of Novolog/Humalog
to be given to cover that
meal.

Sarah will administer 3 units of Novolog®/Humalog® for breakfast.

CORRECTION FACTOR

What is correction factor (CF)?

CF is how many points the blood sugar will drop with 1 unit of insulin.

USING THE CORRECTION FACTOR

- Subtract target blood sugar from current blood sugar.
- Divide this by the correction factor.

$$\frac{\text{Current Blood Sugar} - \text{Target Blood Sugar}}{\text{Correction Factor}} = \text{Correction Insulin Dose}$$

- Example: Before meal blood sugar is 200. Blood sugar target is 120. Correction factor is 40.
- $200 - 120 = 80 \div \text{by } 40 = 2$ units of insulin to correct your high blood level. Add this insulin dose to ICR dose.

Insulin for Breakfast, Lunch, or Dinner - Practice Worksheet

Number of carbs
To eat

÷

Divided
by

ICR
Insulin to carb
Ratio

=

Units of
Novolog/Humalog
for food

Blood Sugar
before meal

-

Minus

Target

=

Number of points above
Target number

÷

Divided by

CF
Correctic
Factor

=

Units of Novolog/Humalog
needed to CORRECT BG
to bring it back to target number

=

CLINICAL NUTRITION

ICR and CF in Diabetes School Packet

Intensive Insulin Management (IIM)

****Verify with parent on whether student eats breakfast at home or school****

Medication:	Humalog/Novolog/Apidra/Fiasp Before Meals, PRN
	Verify with parent on whether student eats breakfast at home or school
Dosage:	<p>Intensive Insulin Management</p> <p>The meal dose is calculated based on two formulas:</p> <ol style="list-style-type: none"> 1. Insulin dose for food (Total Carbohydrates eaten ÷ Insulin to Carb Ratio) 2. Insulin dose for high blood sugar before meal [(Current blood sugar - target blood sugar) ÷ Correction Factor] 3. Total meal dose = #1 plus #2
Meal Dose (Use Insulin Carb Ratio):	1 unit for every 6 grams of carbohydrate
Correction Factor:	1 unit for every 25 mg/dL above target BG of 100 mg/dL
Frequency of Use:	Daily
Administer:	Subcutaneous Injection by syringe or insulin pen, or pump
Condition for which medication is prescribed:	Diabetes Mellitus
Medication may cause:	Hypoglycemia
Emergency Instructions:	Treat hypoglycemia and hyperglycemia according to the algorithms "Treatment of Low Blood Sugars" and "Treatment of High Blood Sugars" included in this packet.
Meal Planning:	School staff to verify with parents current number of carbohydrates for each meal.
Parental Management:	Family educated on dose adjustments. Refer to "Parental Management of Diabetes" section.

CLINICAL NUTRITION

Let's work on some examples....

CLINICAL NUTRITION

EXAMPLE 1

- BG 199, Carbs 60g
- ICR 1:10, CF 35, BG Target 100
- Grams of Carbohydrate \div ICR = Number of units of insulin for the meal
- $60 \div 10 = 6$ units
- $\frac{\text{Current Blood Sugar} - \text{Target Blood Sugar}}{\text{Correction Factor}} = \text{Correction Insulin Dose}$
- $\frac{199 - 100}{35} = 2.8$ units = ~3 units
- Total Insulin Dose for the meal = 9 units

EXAMPLE 2

- BG 66, Carbs 75g; BG recheck 80
- ICR 1:15, CF 60, BG Target 120
- Grams of Carbohydrate \div ICR = Number of units of insulin for the meal
- $75 \div 15 = 5$ units
- $\frac{\text{Current Blood Sugar} - \text{Target Blood Sugar}}{\text{Correction Factor}} = \text{Correction Insulin Dose}$
- No need to use the CF, since BG is in target.
- Total Insulin Dose for the meal = 5 units

EXAMPLE 3

- BG 295, Carbs 45g
- 3 units at meals
- CF 150, BG Target 120
- Grams of Carbohydrate ÷ ICR = Number of units of insulin for the meal
- Fixed meal time dose, no ICR calculation
- $$\frac{\text{Current Blood Sugar} - \text{Target Blood Sugar}}{\text{Correction Factor}} = \text{Correction Insulin Dose}$$
- $$\frac{295 - 120}{150} = 1.16 = \sim 1 \text{ units}$$
- Total Insulin Dose for the meal (3 units for carbs + CF) = 4 units

EXAMPLE 4

- BG 217, Carbs 30g
- 2 units at meals
- Sliding Scale
- 70-175 mg/dL give no additional insulin
- 176-250 mg/dL before a meal, give +1 unit
- 251-325 mg/dL before a meal, give +2 units, check ketones if BG >300
- greater than 325 mg/dL before a meal, give +3 units, check ketones
- Insulin dose for the meal = 2 Units for the meal + sliding scale (176-250 mg/dL before a meal, give +1 unit)
- Insulin dose for the meal = 3 units

EXAMPLE 5

Lunch time:

- BG 301, Carbs 30g, ketones - negative-small
- Lantus 9 units am and 7 units pm
- Humalog 3.5 units breakfast
- 3 units lunch
- 4 units dinner
- Give 3 units of lunch insulin dose
- Encourage sugar free liquids
- Call emergency line to continue to monitor ketones, BG levels and any symptoms

EXAMPLE 6

Lunch time:

- BG 322, Carbs 30g, ketones moderate-large
- Lantus 22 units
- Humalog 5 units breakfast
- 4 units lunch
- 6 units dinner
- Push sugar free liquids
- Call emergency line to make adjustments to insulin dose and to continue to monitor ketones, BG levels and symptoms in 2-3 hours

EXAMPLE 7

- Student at nurse's office c/o illness
- BG 356
- Lantus 25 units am
- Humalog 16 units at meals
- CF 45, BG Target 100
- Check ketones.
- Check if student took Lantus in the morning.
- Give correction insulin and insulin for meal if student is going to eat.
- Give only correction insulin if previous insulin dose was more than 2 hours ago.
- Check BG levels in an hour and BG levels and ketones in 2-3 hours.
- Call emergency line to discuss symptoms and if the student needs to go to EC.

EXAMPLE 8

- Student at nurse's office with nausea, sweaty, vomited last night, no insulin for breakfast because he was not going to eat, FBS 216
- BG 494, moderate ketones
- ICR 7, CF 21, BG Target 100
- Call diabetes clinic emergency line.
- Encourage sugar free liquids
- Diabetes educator will make recommendations on adjustments to insulin dose and make a recommendation if the student needs to go to the EC.



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COMMENTS/QUESTIONS?